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ABSTRACT

Three elementary school programs are examined for principles of direct instruction positively related to increased levels of student academic performance in reading and mathematics. "Direct instruction" refers to activities that cover content at low error rate while involving students in academically relevant pursuits. Such activities include emphasizing academic work, teacher-directed instruction, controlled practice, supervising seatwork, and working with students in small groups. The major program analyzed is the Oregon Direct Instruction Follow Through Model, with direct instruction characteristics examined in six areas: allocated time; instructional setting; controlled practice in small groups; reinforcement; monitoring progress, providing remediation, and accelerating students; and design of materials and instruction Two other programs examined for direct instruction principles are the Texas First Grade Reading Group Study and the Missouri Mathematics Effectiveness Project. An overall picture of direct instruction is presented consisting of seven general observations. (MJB)

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Instructional Principles in Direct Instruction[1]

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Direct instruction refers to those classroom activities which maximize covering content at a low error rate and engaging students in academically relevant activities. The word "direct" is used because recent research in elementary grade teaching (see reviews by Rosenshine, 1976, 1977; Berliner and Rosenshine, 1977; Medley, 1977) has been showing that it is the direct activities which are related to student achievement gain in reading and math. Such direct activities include emphasizing academic work, teacher directed instruction, controlled practice, supervising seatwork, and working with students in small groups. In contrast, "indirect" activities such as questions about student opinions or personal life, encouraging students to select their own activities, student socialization, or having a variety of concurrent activities have been consistently negatively related to student achievement gain. Although one might expect that these indirect activities would motivate a student to work longer on academic matters, in practice, these indirect and informal activities detract from academically engaged time and, hence, from content covered and student achievement gain.

At present, the term direct instruction is limited to instruction in reading and math in the elementary grades (Kindergarten through 6th). There is too little research, as yet, to discuss optimal practices for other educational outcomes or for the upper grades.

In order to illustrate direct instruction, the major instructional principles from one program are discussed below. The program selected is

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the University of Oregon Follow Through Model, formerly known as the Engelmann-Becker Model and now called the Direct Instruction Model. After presenting the major principles from the Direct Instruction Model, we will augment these principles by describing similar principles from a successful experimental study in first grade reading (Ogden et al., 1977; Anderson et al., 1977), a successful experimental study in fourth grade math (Good et al., 1978). These additional studies have instructional procedures that are quite similar to those of the Direct Instruction Model. It is unfortunately confusing to have both the Oregon Direct Instruction Follow Through Model and the concept of "direct instruction", and hopefully, someone will change their name, soon.

Direct Instruction Activities

In order to illustrate direct instruction, six areas from the Oregon Direct Instruction Model are described below. Although a few of the skills are unique to the Oregon program, the descriptions were written to provide a general view of direct instruction.

Allocated time

Each child is in a small group for reading, for math, and for arithmetic for 30 minutes in each subject. Students also spend at least 40 minutes on assigned seatwork (most of which is work on DISTAR materials but also includes seatwork which the teacher prepares). An additional 20 minutes is spent either in criterion teaching time (eg., remediation) or seatwork, depending on the progress of the individual child. There are also 15 minutes allocated for large group work in spelling, and 10 minutes for large group work in arithmetic.

Overall, the allocated time for the Direct Instruction Model includes 30 minutes of small group work in each of three subject areas (reading, math, and aritnmetic), a total of 25 minutes of large group work in math and spelling, and 70 minutes in seatwork and/or criterion teaching time (make up or remedial work) for a total of 3 hours and 5 minutes of allocated time in reading, language, and arithmetic. In addition, it is suggested that an hour and 45 minutes be devoted to story reading time, social studies or science, art, music or library, and independent reading or activity centers.

Instructional setting.

The students receive most of their instruction in a small group setting of 5 to 8 children who are at the same skill level and who can progress at approximately the same rate. This instruction usually lasts 30 minutes. Children also spend approximately 15 to 20 minutes a day in large group language instruction and, in the first two levels, 10 minutes a day in large group arithmetic. The large group tasks are those which involve a lot of repetitive work such as counting, memorizing arithmetic facts, and repeating statements.

The rational for use of rapid-paced, teacher-directed, small group instruction is that it is more efficient than one-to-one instruction and is superior to large group instruction because a small group provides better teacher direction, supervision, and individualization. Further, as Becker (1977) argues, small group instruction emphasizes oral communication skills and provides a setting in which the repetitious practice necessary for some important skills is made more fun by transforming drill into a challenging game. He argues that children enjoy the rapid pacing when circumstances allow them to be successful.

Further, in small group settings used in Direct Instruction, child errors are treated as group errors and the lower performing children are not singled out when they make errors.

Seating. Small groups are set up so that the children face the corner of the room, and sit in a semicircle as close to the teacher and as close to each other as possible. The lowest performers in a group are seated directly in front of the teacher so that their performance can be monitored constantly. This is particularly necessary for students who tend to respond too softly for the teacher to hear (thus, the teacher can watch their mouths) or students who tend to answer after other children have given the answer. Similarly, in large group settings the lower performing students sit directly in front of the teacher so that the teacher can make sure that they are firm on the information.

Controlled Practice in a Small Group

Securing attention. Teachers are instructed to give a few simple commands (eg., "Sit up big"), quickly scan the group to check all children, and immediately begin presenting the tasks.

Presenting new material. New skills are most often introduced by the teacher modeling, or demonstrating the skill. For example, to teach blending the teacher begins by saying, "Listen. Aaammm." This demonstration shows the children the response that they will be expected to give. After modeling, the teacher then leads the children by responding with them. The next part of the task is, "Say it with me. Aaammm." This leading also serves as a model and the students are less likely to make mistakes when they respond with the teacher. The last step in the task is, "All by yourselves. Saying the sounds in aamm. Get ready." This part of the task is the test, when the students respond on their own. In sum, this procedure of model-lead-test is used to introduce new material. In addition, when the students

make mistakes, the same model-lead-test procedure is used to correct the mistake.

Pacing. The suggested pace is quick. The teacher presents tasks quickly, and asks questions to confirm the children's understanding of the tasks. Hundreds of responses are required from the children for each lesson. The teacher is expected to move briskly through the tasks both in order to maintain student attention and also to cover more material. Some of the methods for providing variety in the presentation include using rhythmical pacing, keeping the lesson moving quickly, interspersing group and individual turns, providing short "change ups" where the children can sit up, stretch, or take a break, vary the pause before the signal, vary his/her voice, and use challenges and games.

Frequency of questions. There is a high frequency of questions in each small group lesson. Hundreds of group and individual questions are asked during the allocated half hour.

Teaching to criterion. Teaching to criterion, or working on each task until all children are "firm", is the most important teaching strategy. As written in the Direct Instruction Manual, "All the children are required to respond to the questions so that each child is actively participating in the teaching-learning process and so that the teacher can know immediately if each child has learned the information." Errors the students make are handled as a group correction. Teachers are trained to correct the group so that other students are prevented from making similar mistakes, the pressure is taken off the individual, and the group is kept busy while focusing attention on an individual student. All the children in the group must know the information presented in the task before the group is presented with a new task. The teacher monitors group responses to

learn when a group is "firm," to identify children who are having difficulties, and to learn when a task should be repeated.

Individual turns. Although the emphasis is on moving the group to criterion, and handling individual errors as group correction, individual turns are included to monitor the progress of specific individuals. These individual turns are particularly important when it appears that the group has reached criterion, because at this point there may still be individuals who are weak. In practice, 70 percent of the responses are choral, and 30 percent are individual turns.

Signals. As Brophy and Evertson (1975) learned, one of the problems with choral responding is that many students can echo the responses of others. In the Direct Instruction program, teacher signals are used to indicate when the children are to respond. The use of a signal (eg., pointing, moving the hand, clapping) requires the children to respond in unison. Teaching teachers how to get children to respond together is one of the major teacher training activities. Similarly, teachers learn how to recognize when a single student is leading the group.

Correcting incorrect answers. Specified procedures for correcting errors are a major part of the instructional program. There are two types of errors: signal errors (eg., child responds before or after signal) and information errors. Correction procedures for specific information errors are frequently given in the format, but usually have the following form.

(a) Present the correction to the group. This usually takes the form of modeling (i.e., demonstrating the correct answer) and then leading the children in the correct answer. For example, if the children stop between sounds when sounding out the word "sad" the teacher would model

(My turn. I'm not going to stop between the sounds. ssaaad) and then lead (Do it with me without stopping. ssaaad. Again. ssaaad).

(b) Repeat the task in its original form, requiring the students to answer independently with no help from the teacher.

(c) Return to the beginning of the format and repeat the entire set of tasks.

This correction procedure of model-lead-test-and repeat the entire format until it can be done without errors is the major procedure for correcting errors. Note that this procedure always involves the group and not merely the individual who made the error. An important training task for the teacher is recognizing when the children are firm and not keeping children on a task long after they have mastered it.

As the children become more competent, the step of "presenting the correction to the group" includes prompts in which the children are asked to apply the strategies they have learned. For example, if the teacher asks "What does 4 + 2 equal?" and the group answers "5", the teacher would say, "No, 4 + 1 = 5, so 4 + 2 = how many?" The entire task would then be repeated.

Thus, when students become more advanced, errors in skills that have been taught using specific strategies are corrected by applying those strategies. Thus, a misidentified word is sounded out, and a miscalculated problem is figured out using the appropriate counting strategies.

Reinforcement

Reinforcement, that is, praising the children for a good performance, is a strong part of the program. Teachers are encouraged to give "task specific praise," that is, letting the children know specifically what it was that they did that was good. In addition to task specific praise, a classroom point system is sometimes used to show children that their work leads to positive results. When a certain quota of points is earned, the children exchange these for privileges, activities, awards, or small prizes such as being a line leader, doing other art activities, or receiving merit certificates or crayons.

In training on reinforcement, teachers are expected to know how to state simple rules (eg., "answer when the teacher signals"), praise children who follow rules, require reasonable responses before praising children.

When undesirable behavior occurs, the teacher is not to ignore it, but rather, the teacher is expected to reinforce appropriate behaviors in other children. For example, if John is not watching the board, the teacher would immediately say something like "Wow, Sally is really watching the board. I really like that." When John does watch the

board, the teacher can acknowledge this by saying, "Now everyone's watching the board! Good." When the child persists in misbehavior, it is suggested that his chair be turned around for two or three minutes, the lesson be continued with the rest of the group, and praise given to the other children. After two or three minutes the child is brought back into the group and, when appropriate behavior occurs, the teacher should praise the child.

Monitoring student progress, providing remediation, and accelerating students

There are three special procedures for monitoring student progress: the Continuous Progress Tests, and In-Program Tests, and the Daily Worksheets. In each case, the data from these instruments is used to provide individual or group remediation or acceleration by skipping some lessons.

Continuous progress tests. Continuous progress tests are given every six weeks in each of the three subject areas: reading, language, and math. The tests cover the major content taught during the previous six weeks. For each area which the group fails (eg., symbol identification, pair relationships) specific lessons and tasks within these lessons are listed for reteaching. All tasks listed for reteaching should be taught until the children can perform on these tasks without errors.

Individual remediation. If an individual child fails a section of the continuous progress test, but the rest of the group does not, there are a number of options for bringing this child to criterion. The teacher may reteach some lessons to the entire group and concentrate on giving individual turns to the low-performing child; if the difficulty occurred because of absences the child may remain in his group and also be placed in a lower performing group for remediation; the child may receive special

teaching during "make-up criterion teaching time"; or the child may be placed in a lower performing group.

Skipping. The Continuous Progress Tests can provide information which allows the teacher to skip lessons if, for example, a group scores about 90 percent correct on two consecutive segments of the continuous progress tests with no child requiring an individual remedy.

In-program tests. In a few of the programs, particularly Reading I, there are also "in-program tests" which appear after every five lessons or so. These tests serve the same function as the continuous progress tests, they provide the teacher information on whether the children are firm on previously taught skills, specify remediation tasks, and specify skipping procedures if the children pass the tests. When students do well, teachers are encouraged to skip lessons indicated and accelerate the children as much as possible.

Daily Worksheets. Children also complete daily independent worksheets throughout the program. As with the Continuous Progress Tests and the In-Program Mastery tests, the teacher is expected to use the error data from these worksheets to tutor individual children or to spend extra time working on a difficult task with the entire group.

Criterion teaching time. Criterion teaching time is a special 20 minute period in the afternoon when children are firmed on tasks or lessons that are troublesome. Individual children who need tutoring, children who have been absent, or children or a group who are weak on certain tasks or skills receive extra teaching during this time. The time can also be used to finish a group lesson which was not finished during the regularly scheduled morning period because of an unexpected event such as a fire drill or special assembly.

Design of materials and instruction

The Direct Instruction sponsors suggest that their materials and procedures are unique in that they contain careful control of task sequencing, control of practice children receive, structure of the tasks in the most explicit and simplified form, and specified teaching techniques.

In addition, the teacher presentation books contain detailed scripts to guide the presentation of each task. Tasks of a given type follow the same format. The use of common formats for many tasks simplifies the teacher's job because the teacher prepares for a lesson by focusing mainly on new formats or variations of formats already known.

The daily lessons also specify the main goal of each task, where the children are likely to make errors, and the specific teaching techniques which need to be used. The teacher's guide for each lesson also contains common teaching errors (eg., failure to firm children on certain terms), procedures for evaluating the children's performance, correction procedures when a child makes an error, tests for individual children, and correction procedures for individual children. Knowledge of format--whether a teacher can use signals, the teaching strategy, and the specified examples--is a major item in evaluating individual teachers.

Other Direct Instruction Programs

The general instructional principles described above are not limited to the Oregon Direct Instruction Model. In the Texas First Grade Reading Group Study (Anderson, Brophy, and Evertson, 1977; Ogden, Brophy, and Evertson, 1977), an experimental study involving middle class students, the major skills were quite similar to those described above. These included:

starting lessons quickly

seating the students with their back to the class and the teacher facing both the reading group and the class

using a high frequency of questions

giving task specific praise and task specific criticism

after presenting new material, checking student understanding by asking questions or having them repeat the explanation

giving clues to help them decipher words

handling incorrect answers by giving a clue and avoiding simply giving the correct answer

Similarly, in the Missouri Mathematics Effectiveness Project (Good, 1978) in which the 20 experimental fourth grade classrooms moved from the 25th percentile to the 57th percentile on the SRA standardized test in 11 weeks (!), the instructional behaviors which the teachers implemented clearly represent direct instruction. The first eight minutes were spent collecting the daily homework assignments and reviewing the concepts and skills associated with the homework. The next 20 minutes were spent on development. This began with the teacher explaining and demonstrating the new skills and concepts, followed by assessment of student comprehension by asking them to explain the process and supervising them as they worked two problems. Teachers were instructed to recycle this phase if students were making errors. Fifteen minutes were then spent on seatwork with the teacher helping students, letting them know their work would be checked at the end of the period, and then checking selected students' work. About 15 minutes of homework was assigned at the end of each class. Teachers also reviewed the past week's work every Monday, and the past month's work every fourth Monday.

Thus, the general principles of direct instruction--academic focus, controlled practice, recycling until mastery is achieved, and frequent review--are emerging across a variety of studies in reading and math achievement in the elementary grades. The fact that independent investigators developed similar skills is additional validation of the concept of direct instruction.

The overall picture is one of a general, structured, "direct instruction" model.

1. New material is taught in small steps in a manner that allows for minimized student errors. New material is presented using a model-prompt-test procedure in which the teacher first explains or models the procedure, then gives the students help in using the skill, and finally tests the students as they work independently.

2. Corrections are taught in similar small steps, again using a model-prompt-test procedure.

3. Provisions are made so that all children are taught until mastery occurs; this includes providing for active student participation and for recycling of learning when needed.

4. Although instruction takes place in groups, progress of each child is monitored through the seating arrangements and through the individual turns. This helps insure mastery for each child.

5. Student attention is obtained through the seating arrangements, the frequent questions, the fast pace, and the specific reinforcement.

6. Weekly and monthly progress is monitored, thus allowing for remediation or acceleration.

7. Sufficient time is allocated.

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